Water Supply Benefits

Narrative description of the project's economic costs:

The estimated capital cost to construct the project is $4.46 million, which will be incurred between 2011 and 2013.

Operation and maintenance costs are estimated to be $14,700 per year, starting in 2013. An additional maintenance cost of $18,400 is incurred every 5 years.

The present value of the total cost of the Fancher Creek Flood Control Improvement project (the "Project"), assuming a useful life of 30 years, is $4.22 million. Furthermore, the net present value of the quantifiable flood prevention benefits and water supply benefits over the same useful life is $13.17 million. Therefore, the overall cost-benefit ratio of the project is 3.12.

Cost details for the entire project using Table 14 and the information in Table 6:

[See Table 14]

Estimates of without-project conditions; e.g. current and future water supplies and demand:
Without Project:

The local groundwater aquifer is a primary source of drinking water, and it has experienced overdraft in the last 60 years. According to the City Urban Water Management Plan from 2008 ("UWMP"), the 2007 overdraft was approximately 57,000 acre-feet. Currently, approximately half of the recharge water is received through existing entitlements from Millerton Lake and Pine Flat Reservoir. However, population growth continues to place greater and greater demands on these groundwater sources, and may result in the accelerated draw down of the aquifer in future years. Per the UWMP, one of the City's goals will be to reduce groundwater pumping and increase groundwater recharge, in order to achieve balance in the aquifer by 2025.

The existing infrastructure of Basin "BO" has historically provided for approximately 540 acre-feet per year of groundwater recharge. However, the volume of annual recharge from imported surface water has been significantly limited by the lack capacity in the current canal delivery system to Basin "BO." Currently the basin is solely connected to the Eisen Ditch and it cannot deliver sufficient water to fill the basin during the summer months. The Project includes a feature to resolve the delivery limitation via the construction of a new turnout into the new pipeline construction also included in the Project. Without the Project, the City and County would lose much needed additional groundwater recharge up to approximately 740 acre-feet per year. Furthermore, population growth in the City will place an added burden on draft from groundwater, making the need to replace this overdraft with more groundwater recharge beneficial.

Furthermore, the City would lose approximately 65.1 acre-feet per year of non-potable surface water for irrigation and landscaping of existing and future developments. Without other alternatives, imported water or groundwater would be required to satisfy these water demands.

Estimates of with-project conditions; e.g., improvements in new water supplies made available to meet demand:

The Project will provide up to approximately 740 acre-feet per year of additional water to recharge the aquifer. In line with its goals, the City will be able to increase groundwater recharge without increasing the cost of annually importing water. This results in an annual cost savings of $63,500.

Additionally, the Project will create a new supply of 65.1 acre-feet in non-potable surface water. This water will be used for irrigation and landscape maintenance. The resulting effect is that the City will not import an additional 65 acre-feet per year of surface water, to service these needs. This is a cost savings to the City of approximately $5,600 per year. Other water cost savings benefits will be received by the Fresno Metropolitan Flood Control District (the "District") and other users of the non-potable storm water from Basin "BO." It is expected that a total of $21,100 per year in savings will be incurred by such users. This is water that would otherwise be extracted from groundwater, thus eliminate the need for the groundwater recharge program to offset such extraction.

Description of methods used to estimate without- and with-project conditions:

The additional groundwater recharge capacity was estimated by the District based on the amount of flow capacity required to fill Basin "BO" to authorized levels. The cost of water from surface water entitlements was based on the 2005 contract rate with United States Bureau of Reclamation, of $85.83 per acre-foot. In determining the benefits of additional groundwater recharge, two alternatives were considered: (1) the cost of recharging 740 acre-feet into the groundwater basin using surface water entitlements and (2) the cost of recharging groundwater using the storm water flows. It was assumed for purposes of this analysis that the additional cost of Option (2), aside from the maintenance of Basin "BO," is $0.

The surface water demands for irrigation and landscape maintenance were determined based on estimates provided by Fresno Metropolitan Flood Control District. Similar to groundwater recharge, the total annual cost saving for the City was determined by examining two alternatives: (1) the cost of purchasing 65.1 acre-feet of imported water for irrigation and landscape maintenance, and (2) the cost of pumping storm water from Basin "BO" for the same purpose.

Additionally, the cost savings to non-potable water users were estimated based on the City's water rates published in the Urban Water Management Plan (UWMP), of $0.606 per 100 cubic feet which is equivalent to approximately $264 per acre-foot. Assuming that non-potable water users receive 65.1 acre-feet per year, the net benefit to users over the 30 year life of the Project (starting in 2013) is approximately $203,000. However, in order to avoid double counting benefits derived from the Project, this additional benefit was not included in the cost-benefit analysis.

Description of the distribution of local, regional, and statewide benefits:

Benefit	Measure	Value	Beneficiaries
Groundwater Recharge	Quantitative	$85.83 per AF (2013)	Local/Regional
Non-potable Water Supply (City)	Quantitative	$85.83 per AF (2013)	Local/Regional
Cost Savings (Non-Potable Water Users)	Quantitative	$264 per AF (2013) $203,000 (Project Life)	Local

+ Likely to have minor impacts
++ Likely to have significant impacts
+++ Likely to have very significant impacts

Local/Regional Benefits:

1. The Project will increase groundwater recharge by up to 740 acre-feet per year
2. The Project will create an additional non-potable water supply of 65.1 acre-feet per year.
3. The Project will provide a cost savings benefit for the non-potable water users and it will save the City the cost of extraction and replace of that water had potable groundwater been used.
4. The Project will allow the City to take steps to achieve groundwater pumping "balance" by 2025.

Statewide Benefits:

1. The Project will result in more groundwater recharge and a non-potable water source, which will reduce the need for imported surface water to fulfill the same purpose.

Identification of beneficiaries:

1. The City of Fresno will benefit from increased groundwater recharge, without requiring additional purchases of surface water.
2. The City will benefit from a new non-potable water source, which will result in either less groundwater pumping or reduced surface water imports to fulfill that need.
3. The users of non-potable water will benefit from servicing irrigation and landscape maintenance needs without increasing annual water fees.
4. The US Department of Reclaimed Water will benefit from reduced demands on surface water resources that could then be diverted to other areas.

When the benefits will be received:

The benefits of the Project will be received starting in December 2012 and full benefits no later than December 2013, when the Project is constructed and fully operational.

Uncertainty of the benefits:

The Project is expected to recharge approximately 740 acre-feet per year in the local aquifer. This estimate represents the projected added volume of water delivered to Basin "BO" that would be required to fill Basin "BO" during the summer recharge season. The greater depth and volume delivered will increase the percolation within the basin. Also, the capture and retention of storm water will increase as a result of greater storage for winter storm runoff. The estimate is an average and the actual

amount will vary year to year, with greater percolation in the period immediately following the removal of silts from the basin floor.

Description of any adverse effects:

The Project will have one-time construction impacts. Performance provisions have been included in the specifications for Basin "BO" and will be included in the project contract language to minimize adverse effects.

The District has developed various performance standards that are routinely implemented during the construction and operation of projects, as applicable. Therefore, the standards are considered to be part of the project, rather than mitigation measures. Please see "Water Quality – Description of any adverse effects" Section for details on the standards.

Narrative discussion that describes, qualifies, and supports the values entered in the tables:

Two tables, 15(a) and 15(b), were prepared to analyze the water supply benefits. Table 15(a) estimates the benefits of groundwater recharge. Column (d) shows the current performance of Basin "BO" based on historical data collected and the current capacity. Based on the additional capacity, the District expects an additional 740 acre-feet will be recharged annually, increasing the recharge capacity of Basin "BO" to 1,280 acre-feet as shown in column (e). The unit value per acre-foot of water in column (g) was estimated at $85.83 based on the 2005 contract rate between the Bureau of Reclamation and the City of Fresno for surface water entitlements. An annual value of $63,514, shown in column (h), will be realized starting in 2013. Applying a discount factor of 6% results in a present value discounted benefit of $751,070.

Table 15(b) estimates the benefits of 65.1 acre-feet of new non-potable surface water. Since surface water is used for both groundwater recharge and irrigation purposes, it is reasonable to assume similar unit value assumptions as those for groundwater recharge, shown in column (g). An annual value of $5,588 shown in column (h) is expected starting in 2013. Applying a discount factor of 6% results in a present value discounted benefit of $66,074.

If possible, quantified estimates of physical and economic benefits using Table 15, 16, and 17, as applicable. Table 15 is used to present physical and economic benefits. Table 16 is used for the benefits in an avoided cost of future projects. Table 17 is used if the benefit is estimated in some other way (i.e., not using a unit monetary value or an avoided cost).

[See Tables 15, 16, and 17]

Documentation to support information presented in the project, including studies, reports, and technical data, which will be used to assess the project's ability to produce the benefits claimed.

- City of Fresno 2008 Urban Water Management Plan Update (Attachment 3: Work Plan - Exhibit 16)
- Final Environmental Impact Report (Attachment 3: Work Plan - Exhibit 17)
- Fresno Metropolitan Flood Control Service Plan (Attachment 3: Work Plan - Exhibit 18)
- Resolution of Support (Attachment 3: Work Plan - Exhibit 19)

- California Regional Water Quality Control Board NPDES Permit (Attachment 3: Work Plan - Exhibit 20)

Table 14- Annual Cost of Project

(All costs should be in 2009 Dollars)

Project: Fancher Creek Flood Control Improvements

	Initial Costs	Operations and Maintenance Costs						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total cost From Table 6 (row (i), column (d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +…+ (f)	Discount Factor	Discounted Costs (g) x (h)
2009	$1,136,132	$1,200	$350	$1,700	$0	$0	$1,139,382	1.000	$1,139,382
2010	$638,103	$1,300	$375	$1,700	$0	$0	$641,478	0.943	$605,168
2011	$671,985	$1,400	$400	$1,700	$0	$0	$675,485	0.890	$601,179
2012	$1,343,968	$1,500	$1,100	$3,600	$100	$0	$1,350,268	0.840	$1,133,711
2013	$671,985	$1,600	$3,000	$9,600	$500	$0	$686,685	0.792	$543,919
2014	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.747	$10,985
2015	$0	$1,600	$3,000	$28,000	$500	$0	$33,100	0.705	$23,334
2016	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.665	$9,776
2017	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.627	$9,223
2018	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.592	$8,701
2019	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.558	$8,208
2020	$0	$1,600	$3,000	$28,000	$500	$0	$33,100	0.527	$17,437
2021	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.497	$7,305
2022	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.469	$6,892
2023	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.442	$6,502
2024	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.417	$6,134
2025	$0	$1,600	$3,000	$28,000	$500	$0	$33,100	0.394	$13,030
2026	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.371	$5,459
2027	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.350	$5,150
2028	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.331	$4,859
2029	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.312	$4,584
2030	$0	$1,600	$3,000	$28,000	$500	$0	$33,100	0.294	$9,737
2031	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.278	$4,079
2032	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.262	$3,848
2033	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.247	$3,631
2034	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.233	$3,425
2035	$0	$1,600	$3,000	$28,000	$500	$0	$33,100	0.220	$7,276
2036	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.207	$3,048
2037	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.196	$2,876
2038	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.185	$2,713
2039	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.174	$2,559
2040	$0	$1,600	$3,000	$28,000	$500	$0	$33,100	0.164	$5,437
2041	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.155	$2,278
2042	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.146	$2,149
2043	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.138	$2,027
2044	$0	$1,600	$3,000	$9,600	$500	$0	$14,700	0.130	$1,913
Project Life								…	
								Total Present Value of Discounted Costs (Sum of Column (i))	$4,227,933
								Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries	

Comments:

Table 15A - Annual Water Supply Benefits
(All benefits should be in 2009 dollars)
Project: Fancher Creek Flood Control Improvements

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value	(h) Annual $ Value (f) x (g)	(i) Discount Factor	(j) Discounted Benefits (h) x (i)
2009	Groundwater Recharge	Acre-Feet	540	540	0	$85.83	$0	1.000	$0
2010	Groundwater Recharge	Acre-Feet	540	540	0	$85.83	$0	0.943	$0
2011	Groundwater Recharge	Acre-Feet	540	540	0	$85.83	$0	0.890	$0
2012	Groundwater Recharge	Acre-Feet	540	540	0	$85.83	$0	0.840	$0
2013	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.792	$50,309
2014	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.747	$47,462
2015	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.705	$44,775
2016	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.665	$42,241
2017	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.627	$39,850
2018	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.592	$37,594
2019	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.558	$35,466
2020	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.527	$33,458
2021	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.497	$31,565
2022	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.469	$29,778
2023	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.442	$28,092
2024	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.417	$26,502
2025	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.394	$25,002
2026	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.371	$23,587
2027	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.350	$22,252
2028	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.331	$20,992
2029	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.312	$19,804
2030	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.294	$18,683
2031	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.278	$17,626
2032	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.262	$16,628
2033	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.247	$15,687
2034	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.233	$14,799
2035	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.220	$13,961
2036	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.207	$13,171
2037	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.196	$12,425
2038	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.185	$11,722
2039	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.174	$11,058
2040	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.164	$10,433
2041	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.155	$9,842
2042	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.146	$9,285
2043	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.138	$8,759
2044	Groundwater Recharge	Acre-Feet	540	1,280	740	$85.83	$63,514	0.130	$8,264
Project Life								…	
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		$751,070

Comments:

Table 15B - Annual Water Supply Benefits
(All benefits should be in 2009 dollars)
Project: Fancher Creek Flood Control Improvements

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value	(h) Annual $ Value (f) x (g)	(i) Discount Factor	(j) Discounted Benefits (h) x (i)
2009	Non-potable Surface Water	Acre-Feet	0.0	0.0	0.0	$85.83	$0	1.000	$0
2010	Non-potable Surface Water	Acre-Feet	0.0	0.0	0.0	$85.83	$0	0.943	$0
2011	Non-potable Surface Water	Acre-Feet	0.0	0.0	0.0	$85.83	$0	0.890	$0
2012	Non-potable Surface Water	Acre-Feet	0.0	0.0	0.0	$85.83	$0	0.840	$0
2013	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.792	$4,426
2014	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.747	$4,175
2015	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.705	$3,939
2016	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.665	$3,716
2017	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.627	$3,506
2018	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.592	$3,307
2019	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.558	$3,120
2020	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.527	$2,943
2021	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.497	$2,777
2022	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.469	$2,620
2023	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.442	$2,471
2024	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.417	$2,331
2025	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.394	$2,200
2026	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.371	$2,075
2027	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.350	$1,958
2028	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.331	$1,847
2029	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.312	$1,742
2030	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.294	$1,644
2031	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.278	$1,551
2032	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.262	$1,463
2033	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.247	$1,380
2034	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.233	$1,302
2035	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.220	$1,228
2036	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.207	$1,159
2037	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.196	$1,093
2038	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.185	$1,031
2039	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.174	$973
2040	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.164	$918
2041	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.155	$866
2042	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.146	$817
2043	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.138	$771
2044	Non-potable Surface Water	Acre-Feet	0.0	65.1	65.1	$85.83	$5,588	0.130	$727
Project Life								…	
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		$66,074

Comments:

Table 18. Total Water Supply Benefits
(All benefits should be in 2009 dollars)

Project: Fancher Creek Flood Control Improvements

Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (e) (a) + (c) or (b) + (c)
$11,804,592	$0	$0	**$11,804,592**

Comments: